Combining Economic and Ecological Indicators to Prioritize Salt Marsh Restoration Actions

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Prioritizing salt marsh restoration

Question: How should we spend limited restoration budgets to maximize ecosystem services and benefits?

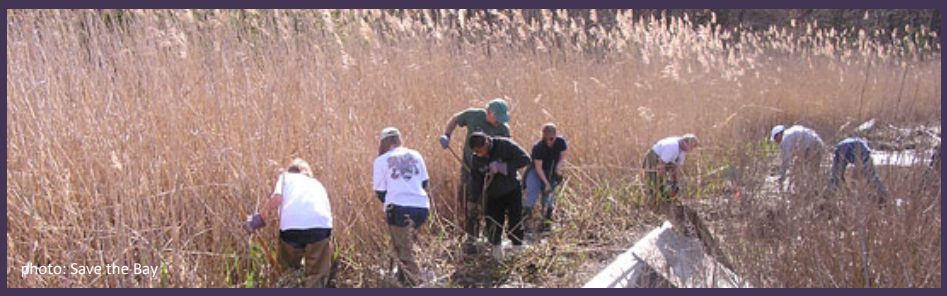

photo: Save the Bay

What do we need to know?

1. How do restoration actions change wetland services?
2. How do changes in services affect people's values?


Photo: Save the Bay, RI


Photo: John Repoza

Question 1: How do restoration actions change wetland services?

Specific Restoration Actions – remove tidal restrictions, change elevations, change vegetation, add buffers

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Δ Marsh Condition: Tidal flow, vegetation, marsh size, salinity, water depth, etc.

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Δ Bird and fish habitat quality: fish passage and spawning, bird nesting and foraging, food sources, shellfish beds, etc.

Photos from Save the Bay, RI

Expert survey objective

Estimate ecological production function

habitat quality $_{species}$ = f(site and location features)

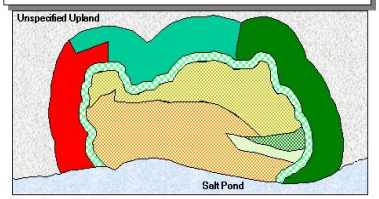
using readily available data

Expert survey

Site 8

Please review the information on this page, and then answer the questions on the facing page.

65 acre wetland and 500' of surrounding landscape



Composition of the **65** acre wetland:

- Salt Marsh **(35 acres, 10% low marsh)**
- Phragmites Marsh **(24 acres)**
- Brackish Marsh **(3 acres)**
- Estuarine Scrub-Shrub Marsh **(3 acres)**

Scale: 500 feet

Composition of adjacent 500' of upland:

- 100' upland **shrub** buffer
- Developed Land **(25%)**
- Agricultural and grassed areas **(35%)**
- Forested Land **(40%)**

Additional Information:

There are **no significant tidal flats** adjacent to the wetland.

There is **no eelgrass** in the waters adjacent to the wetland.

Pannes cover 1 % and **pools cover 10 %** of the marsh.

There are **inter-tidal creeks** and **sub-tidal channels** present.

There are **no freshwater wetlands** within a ¼ mile radius of the coastal wetland.

There is **another salt marsh within a ½ mile** radius of this coastal wetland.

There are **no tidal restrictions**.

Public access to the wetland is **restricted**.

Q11

Please give your professional judgment of this site's current potential to provide habitat functions, by circling one number in each row below. If you feel there is insufficient information to answer any of the questions, or if certain species are not within your expertise or experience, please answer accordingly.

Habitat For:	Potential for **Site 8** to provide functions listed below: No Significant Potential	Limited Potential	Moderate Potential	High Potential	Exceptional Potential	Insufficient Information	I do not feel qualified to answer
Wading Bird	0	1	2	3	4	I.I.	N.Q.
Waterfowl	0	1	2	3	4	I.I.	N.Q.
Shorebird	0	1	2	3	4	I.I.	N.Q.
Marsh Dependent Songbird	0	1	2	3	4	I.I.	N.Q.
Other Songbirds	0	1	2	3	4	I.I.	N.Q.
Overall Bird Habitat	0	1	2	3	4	I.I.	N.Q.
Marsh Resident Fish	0	1	2	3	4	I.I.	N.Q.
Marsh Non-resident Fish	0	1	2	3	4	I.I.	N.Q.
Overall Fish Habitat	0	1	2	3	4	I.I.	N.Q.
Shellfish Habitat	0	1	2	3	4	I.I.	N.Q.

1) If you answered **insufficient information** for any of the above, please let us know what we missed (please be as specific as possible):

2) Additional Comments:

25

Question 2: How do changes in services affect people's values?

Δ Bird and fish habitat quality: fish passage and spawning, bird nesting and foraging, food sources, shellfish beds, etc.

↓

ΔPopulations of birds and fish

↓

ΔCatch rates, viewing opportunities, and nonuse services

↓

Δ Social Benefits from fishing, bird watching, and nonuse values

Public survey

1. ON THIS PAGE, COMPARE RESTORATION PLANS 1 AND 2 AND VOTE BELOW FOR THE PLAN YOU PREFER:

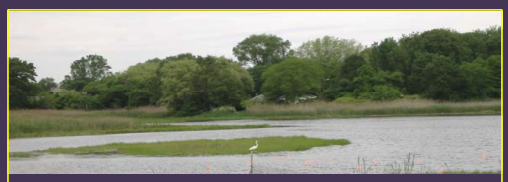
Check one box:

☐ I choose NEITHER PLAN ($0 per year)	☒ I choose RESTORATION PLAN 1 ($ 20 per year)	☐ I choose RESTORATION PLAN 2 ($ 20 per year)

		Restoration Plan # 1	Restoration Plan # 2
		Improvement: gains from restoration* (0= no improvement, 10= highest):	
Ecological Improvement to RI **Bird** Populations*		1	1
Ecological Improvement to RI **Fish** Populations*		2	2
Ecological Improvement to RI **Shellfish** Populations*		2	4
Potential to Control **Mosquito** Nuisance*		7	2
Access for **Recreation**		Viewing platforms & no trails	no access
Size of Salt Marsh		3 Acres	9 Acres
Annual **Cost** of the Plan to YOUR HOUSEHOLD	$	$20 PER YEAR IN HIGHER STATE TAXES	$20 PER YEAR IN HIGHER STATE TAXES

* As judged by wetland experts, compared to all other potential salt marsh restoration projects in Rhode Island.

Combining expert and public survey results to evaluate restoration projects



Restoration Site 1

widen tidal inlet; restore creeks; remove dredge spoils; restore vegetation

Habitat Index:	Before	After
Birds	2.1	3.1
Fish	2.0	3.1
Shellfish	2.5	2.9
Change in Value Index		**1.4**

Restoration Site 2

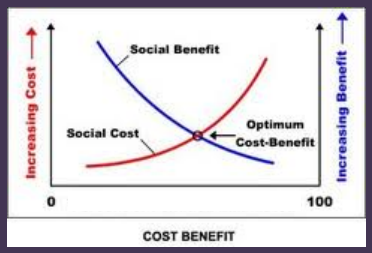
create new connector channel to existing tidal channel

Habitat Index:	Before	After
Birds	2.7	3.1
Fish	1.6	2.8
Shellfish	2.3	2.8
Change in Value Index		**0.75**

Photos from Save the Bay, RI

Ways to use this type of model

Estimate greatest social benefit from a restoration budget (economists' preferred approach)



- Justify funding for selected sites
- Return on investment
- Discourse-based decisions

(real world approaches)

Thank you!

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